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is an indispensable necessary of life.—This I grant; yet I think that the felling of the woods may be so regulated as to render economy and utility perfectly compatible, viz. in the following manner.

Let it be supposed that the N. W. and S. E. are the ætliæ or prevailing winds of North America; let the surveyor general mark out a tract of say 100 or 200 miles in a right line to be cleared of trees; then every blast from these two opposite points will ventilate 200 miles of country, bearing along the fumes of all the marshes, while the great *visão* or avenue skirted with wood at both sides would furnish the most salubrious and consequently valuable situation for settlers.

Nº. XXX.

A Memoir on the Discovery of certain Bones of a Quadruped of the Clawed Kind in the Western Parts of Virginia.
By THOMAS JEFFERSON, Esq.

Read March 10, 1797. **I**N a letter of July 3d, I informed our late most worthy president that some bones of a very large animal of the clawed kind had been recently discovered within this state, and promised a communication on the subject as soon as we could recover what were still recoverable of them. It is well known that the substratum of the country beyond the Blue Ridge is a limestone, abounding with large caverns, the earthy floors of which are highly impregnated with nitre; and that the inhabitants are in the habit of extracting the nitre from them. In digging the floor of one of these caves, belonging to Frederic Cromer in the county of Greenbriar, the labourers at the depth of two or three feet, came to some bones, the size and form of which
bespoke

bespoke an animal unknown to them. The nitrous impregnation of the earth together with a small degree of petrification had probably been the means of their preservation. The importance of the discovery was not known to those who made it, yet it excited conversation in the neighbourhood, and led persons of vague curiosity to seek and take away the bones. It was fortunate for science that one of its zealous and well informed friends, Colonel John Stewart of that neighbourhood, heard of the discovery, and, sensible from their description, that they were of an animal not known, took measures without delay for saving those which still remained. He was kind enough to inform me of the incident, and to forward me the bones from time to time as they were recovered. To these I was enabled accidentally to add some others by the kindness of a Mr. Hopkins of New-York, who had visited the cave. These bones are,

1st. A small fragment of the femur or thigh bone; being in fact only its lower extremity, separated from the main bone at its epiphysis, so as to give us only the two condyles, but these are nearly entire.

2^d. A radius, perfect.

3^d. An ulna, or fore-arm, perfect, except that it is broken in two.

4th. Three claws, and half a dozen other bones of the foot; but whether of a fore or hinder foot, is not evident.

About a foot in length of the residue of the femur was found, it was split through the middle, and in that state was used as a support for one of the salt petre vats, this piece was afterwards lost, but its measures had been first taken as will be stated hereafter.

These bones only enable us to class the animal with the unquiculated quadrupeds; and of these the lion being nearest to him in size, we will compare him with that animal, of whose anatomy Monsieur Daubenton has furnished

nished very accurate measures in his tables at the end of Buffon's Natural History of the lion. These measures were taken as he * informs us from "a large lion of Africa," in which quarter the largest † are said to be produced. I shall select from his measures only those where we have the corresponding bones, converting them into our own inch and its fractions, that the comparison may be more obvious: and to avoid the embarrassment of designating our animal always by circumlocution and description, I will venture to refer to him by the name of the Great-Claw or Megalonyx, to which he seems sufficiently entitled by the distinguished size of that member.

	Megalonyx. Inches	Lion. Inches.
Length of the ulna, or fore-arm	20.1	13.7
Height of the olecranon -	3.5	1.85
Breadth of the ulna, from the point of the coronoide apophysis to the extre- mity of the olecranon -	9.55	
Breadth of the ulna at its middle	3.8	
Thickness at the same place -	1.14	
Circumference at the same place	6.7	
Length of the radius -	17.75	12.37
Breadth of the radius at its head	2.65	1.38
Circumference at its middle -	7.4	3.62
Breadth at its lower extremity -	4.05	1.18
Diameter of the lower extremity of the femur at the base of the two con- dyles - - -	4.2	2.65
Transverse diameter of the larger con- dyle at its base	3.	
Circumference of both condyles at their base - - -	11.65	

* Buffon, XVIII. 38. Paris edition in 31 vols. 12mo.

† 2. De Manet, 117.

	Megalonyx. Inches.	Lion. Inches.
Diameter of the middle of the femur	4.25	1.15
Hollow of the femur at the same place	1.25	
Thickness of the bone surrounding the hollow - - - }	1.5	
Length of the longest claw -	7.5	1.41
Length of the second phalanx of the same	3.2	1.41

The dimensions of the largest of the foot bones are as follow,

	Inches.
Its greatest diameter, or breadth at the joint	2.45
Its smallest diameter, or thickness at the same place	2.28
Its circumference at the same place -	7.1
Its circumference at the middle -	5.3

	Of long- est toe.	Middle fized toe.	Shortest toe.
2d. Phalanx. Its length	3.2	2.95	
Greatest diameter at its head or upper joint - }	1.84	2.05	
Smallest diameter at the same place - - }	1.4	1.54	
Circumference at the same place	5.25	5.8	
3d. Phalanx. Its length -	*7.5	†5.9	3.5
Greatest diameter at its head or upper joint - }	2.7	2.	1.45
Smallest diameter at the same place - - }	.95	.9	.55
Circumference at the same place	6.45	4.8	

Were we to estimate the size of our animal by a comparison with that of the lion on the principle of *ex pede Herculem*, by taking the longest claw of each as the mo-

* It is actually $6\frac{1}{4}$ inches long, but about $\frac{1}{4}$ inch appear to have been broken off.

† Actually 5.65 but about $\frac{1}{4}$ inch is broken off.

dule of their measure, it would give us a being out of the limits of nature. It is fortunate therefore that we have some of the larger bones of the limbs which may furnish a more certain estimate of his stature. Let us suppose then that his dimensions of height, length and thickness, and of the principal members composing these, were of the same proportions with those of the lion. In the table of M. Daubenton an ulna of 13.78 inches belonged to a lion $42\frac{1}{2}$ inches high over the shoulders: then an ulna of 20.1 inches bespeaks a megalonyx of 5 feet 1.75 inches height, and as animals who have the same proportions of height, length, and thickness have their bulk or weights proportioned to the cubes* of any one of their dimensions, the cube of 42.5 inches is to 262 lb. the height and weight of M. Daubenton's lion as the cube of 61.75 inches to 803 lb. the height and weight of the megalonyx; which would prove him a little more than three times the size of the lion. I suppose that we should be safe in considering, on the authority of M. Daubenton, his lion as a large one. But let it pass as one only of the ordinary size, and that the megalonyx whose bones happen to have been found was also of the ordinary size. It does † appear that there was dissected for the academy of sciences at Paris, a lion of 4 feet $9\frac{3}{8}$ inches height. This individual would weigh 644 lb. and would be in his species, what a man of eight feet height would be in ours. Such men have existed. A megalonyx equally monstrous would be 7 feet high, and would weigh 2000 lb. but the ordinary race, and not the monsters of it, are the object of our present enquiry.

I have used the height alone of this animal to deduce his bulk, on the supposition that he might have been formed in the proportions of the lion. But these were

* Buffon xxii. 121.

† Buffon xviii. 15.

not his proportions, he was much thicker than the lion in proportion to his height, in his limbs certainly, and probably therefore in his body. The diameter of his radius, at its upper end, is near twice as great as that of the lion, and, at its lower end, more than thrice as great, which gives a mean proportion of $2\frac{1}{2}$ for 1. The femur of the lion was less than $1\frac{1}{4}$ inch diameter. That of the megalonyx is $4\frac{1}{4}$ inches, which is more than three for one. And as bodies of the same length and substance have their weights proportioned to the squares of their diameters, this excess of caliber compounded with the height, would greatly aggravate the bulk of this animal. But when our subject has already carried us beyond the limits of nature hitherto known, it is safest to stop at the most moderate conclusions, and not to follow appearances through all the conjectures they would furnish, but leave these to be corroborated or corrected by future discoveries. Let us only say then, what we may safely say, that he was *more* than three times as large as the lion: that he stood as pre-eminently at the head of the column of clawed animals as the mammoth stood at that of the elephant, rhinoceros, and hippopotamus: and that he may have been as formidable an antagonist to the mammoth as the lion to the elephant.

A difficult question now presents itself. What is become of the great-claw? Some light may be thrown on this by asking another question. Do the wild animals of the first magnitude in any instance fix their dwellings in a thickly inhabited country? such, I mean, as the elephant, the rhinoceros, the lion, the tyger? as far as my reading and recollection serve me, I think they do not: but I hazard the opinion doubtingly, because it is not the result of full enquiry. Africa is chiefly inhabited along the margin of its seas and rivers. The interior desert is the domain of the elephant, the rhinoceros, the lion,

lion, the tyger. Such individuals as have their haunts nearest the inhabited frontier, enter it occasionally, and commit depredations when pressed by hunger: but the mass of their nation (if I may use the term) never approach the habitation of man, nor are within reach of it. When our ancestors arrived here, the Indian population, below the falls of the rivers, was about the twentieth part of what it now is. In this state of things, an animal resembling the lion seems to have been known even in the lower country. Most of the accounts given by the earlier adventurers to this part of America make a lion one of the animals of our forests. Sir John Hawkins* mentions this in 1564. Thomas Harriot, a man of learning, and of distinguished candor, who resided in Virginia in 1587† does the same, so also does Bullock in his account of Virginia,‡ written about 1627, he says he drew his information from Pierce, Willoughby, Claiborne, and others who had been here, and from his own father who had lived here twelve years. It does not appear whether the fact is stated on their own view, or on information from the Indians, probably the latter. The progress of the new population would soon drive off the larger animals, and the largest first. In the present interior of our continent there is surely space and range enough for elephants and lions, if in that climate they could subsist; and for mammoths and megalonyxes who may subsist there. Our entire ignorance of the immense country to the West and North-West, and of its contents, does not authorise us to say what it does not contain.

Moreover it is a fact well known, and always susceptible of verification, that on a rock on the bank of the

* Hakluyt, 541. edition of 1589.

† Ibid. 757, and Smith's History of Virginia, 10.

‡ Bullock, page 5.

Kanhawa, near its confluence with the Ohio, there are carvings of many animals of that country, and among these one which has always been considered as a perfect figure of a lion. And these are so rudely done as to leave no room to suspect a foreign hand. This could not have been of the smaller and maneless lion of Mexico and Peru, known also in Africa both in * ancient and † modern times, though denied by ‡ M. de Buffon : because like the greater African lion, he is a tropical animal ; and his want of a mane would not satisfy the figure. This figure then must have been taken from some other prototype, and that prototype must have resembled the lion sufficiently to satisfy the figure, and was probably the animal the description of which by the Indians made Hawkins, Harriot, and others conclude there were lions here. May we not presume that prototype to have been the great-claw ?

Many traditions are in possession of our upper inhabitants, which themselves have heretofore considered as fables, but which have regained credit since the discovery of these bones. There has always been a story current that the first company of adventurers who went to seek an establishment in the county of Greenbriar, the night of their arrival were alarmed at their camp by the terrible roarings of some animal unknown to them : that he went round and round their camp, that at times they saw his eyes like two balls of fire, that their horses were so agonised with fear that they couched down on the earth, and their dogs crept in among them, not daring to bark. Their fires, it was thought, protected them, and the next morning they abandoned the country. This was little more than 30 years ago.—In the year 1765, George Wilson and John Davies, having gone to hunt

* Aristot. Animal, 9. 4. Pliny, 8. 16. † Kolbe. ‡ Buffon, xviii. 18.

on Cheat river, a branch of the Monongahela, heard one night, at a distance from their camp, a tremendous roaring, which became louder and louder as it approached, till they thought it resembled thunder, and even made the earth tremble under them. The animal prowled round their camp a considerable time, during which their dogs, though on all other occasions fierce, crept to their feet, could not be excited from their camp, nor even encouraged to bark. About day light they heard the same sound repeated from the knob of a mountain about a mile off, and within a minute it was answered by a similar voice from a neighbouring knob. Colonel John Stewart had this account from Wilson in the year 1769, who was afterwards Lieutenant Colonel of a Pennsylvania regiment in the revolution-war; and some years after from Davies, who is now living in Kentucky.

These circumstances multiply the points of resemblance between this animal and the lion. M. de la Harpe of the French Academy, in his abridgment of the General History of Voyages, speaking of the Moors, says * “it is remarkable that when, during their huntings, they meet with lions, their horses, though famous for swiftness, are seized with such terror that they become motionless, and their dogs equally frightened, creep to the feet of their master, or of his horse.” Mr. Sparrman in his voyage to the Cape of Good Hope, chap. 11. says, “we could plainly discover by our animals when the lions, whether they roared or not, were observing us at a small distance. For in that case the hounds did not venture to bark, but crept quite close to the Hottentots; and our oxen and horses sighed deeply, frequently hanging back, and pulling slowly with all their might at the strong straps with which they were tied to the waggon. They

* Gentleman's, and London Magazines, for 1783.

also laid themselves down on the ground, and stood up alternately, as if they did not know what to do with themselves, and even as if they were in the agonies of death." He adds that "when the lion roars, he puts his mouth to the ground, so that the sound is equally diffused to every quarter." M. de Buffon (xviii. 31.) describes the roaring of the lion as, by its echoes resembling thunder: and Sparrman c. 12. mentions that the eyes of the lion can be seen a considerable distance in the dark, and that the Hottentots watch for his eyes for their government. The phosphoric appearance of the eye in the dark seems common to all animals of the cat kind.

The terror excited by these animals is not confined to brutes alone. A perion of the name of Draper had gone in the year 1770, to hunt on the Kanhawa. He had turned his horse loose with a bell on, and had not yet got out of hearing when his attention was recalled by the rapid ringing of the bell. Suspecting that Indians might be attempting to take off his horse, he immediately returned to him, but before he arrived he was half eaten up. His dog scenting the trace of a wild beast, he followed him on it, and soon came in sight of an animal of such enormous size, that though one of our most daring hunters and best marksmen, he withdrew instantly, and as silently as possible, checking and bringing off his dog. He could recollect no more of the animal than his terrific bulk, and that his general outlines were those of the cat kind. He was familiar with our animal miscalled the panther, with our wolves and wild beasts generally, and would not have mistaken nor shrunk from them.

In fine, the bones exist: therefore the animal has existed. The movements of nature are in a never ending circle. The animal species which has once been put into a train of motion, is still probably moving in that train. For if one link in nature's chain might be lost, another

and another might be lost, till this whole system of things should vanish by piece-meal; a conclusion not warranted by the local disappearance of one or two species of animals, and opposed by the thousands and thousands of instances of the renovating power constantly exercised by nature for the reproduction of all her subjects, animal, vegetable, and mineral. If this animal then has once existed, it is probable on this general view of the movements of nature that he still exists, and rendered still more probable by the relations of honest men applicable to him and to him alone. It would indeed be but conformable to the ordinary economy of nature to conjecture that she had opposed sufficient barriers to the too great multiplication of so powerful a destroyer. If lions and tigers multiplied as rabbits do, or eagles as pigeons, all other animal nature would have been long ago destroyed, and themselves would have ultimately extinguished after eating out their pasture. It is probable then that the great-claw has at all times been the rarest of animals. Hence so little is known, and so little remains of him. His existence however being at length discovered, enquiry will be excited, and further information of him will probably be obtained.

The Cosmogony of M. de Buffon supposes that the earth and all the other planets primary and secondary, have been masses of melted matter struck off from the sun by the incidence of a comet on it: that these have been cooling by degrees, first at the poles, and afterwards more and more towards their Equators: consequently that on our earth there has been a time when the temperature of the poles suited the constitution of the elephant, the rhinoceros, and hippopotamus: and in proportion as the remoter zones became successively too cold, these animals have retired more and more towards the Equatorial regions, till now that they are reduced to
the

the torrid zone as the ultimate stage of their existence. To support this theory, he * assumes the tusks of the mammoth to have been those of an elephant, some of his teeth to have belonged to the hippopotamus, and his largest grinders to an animal much greater than either, and to have been deposited on the Missouri, the Ohio, the Holston, when those latitudes were not yet too cold for the constitutions of these animals. Should the bones of our animal, which may hereafter be found, differ only in size from those of the lion, they may on this hypothesis be claimed for the lion, now also reduced to the torrid zone, and its vicinities, and may be considered as an additional proof of this system; and that there has been a time when our latitudes suited the lion as well as the other animals of that temperament. This is not the place to discuss theories of the earth, nor to question the gratuitous allotment to different animals of teeth not differing in any circumstance. But let us for a moment grant this with his former postulata, and ask how they will consist with another theory of his “qu’il y a dans la combinaison des élémens et des autres causes physiques, quelque chose de contraire à l’aggrandissement de la nature vivante *dans ce nouveau monde*; qu’il y a des obstacles au développement et peut-être à la formation des grands germes †.” He says that the mammoth was an elephant, yet ‡ two or three times as large as the elephants of Asia and Africa: that some of his teeth were those of a hippopotamus, yet of a hippopotamus § four times as large as those of Africa: that the mammoth himself, for he still considers him as a distinct animal, || “was of a size superior to that of the largest elephants. That he was the primary and greatest of all terrestrial

* Buffon, Epoq. 2. 233, 234. † Buffon, xviii. 145. ‡ 2. Epoq. 223.
§ 1. Epoq. 246. 2. Epoq. 232. || 2. Epoq. 234, 235.

animals." If the bones of the megalonyx be ascribed to the lion, they must certainly have been of a lion of more than three times the volume of the African. I delivered to M. de Buffon the skeleton of our palmated elk, called original or moose, 7 feet high over the shoulders, he is often considerably higher. I cannot find that the European elk is more than two thirds of that height: consequently not one third of the bulk of the American. He* acknowledges the palmated deer (daim) of America to be larger and stronger than that of the Old World. He† considers the round horned deer of these States and of Louisiana as the roe, and admits they are of three times his size. Are we then from all this to draw a conclusion, the reverse of that of M. de Buffon. That nature, has formed the larger animals of America, like its lakes, its rivers, and mountains, on a greater and prouder scale than in the other hemisphere? Not at all, we are to conclude that she has formed some things large and some things small, on both sides of the earth for reasons which she has not enabled us to penetrate; and that we ought not to shut our eyes upon one half of her facts, and build systems on the other half.

To return to our great-claw; I deposit his bones with the Philosophical Society, as well in evidence of their existence and of their dimensions, as for their safe-keeping; and I shall think it my duty to do the same by such others as I may be fortunate enough to obtain the recovery of hereafter.

TH: JEFFERSON.

Monticello, Feb. 10th, 1797.

* Buffon, xxix. 245.

† Ibid. xii. 91. 92. xxix. 245. Vide Suppl. 201.

P. S. *March 10th*, 1797. After the preceding communication was ready to be delivered in to the Society, in a * periodical publication from London I met with an account and drawing of the skeleton of an animal dug up near the river La Plata in Paraguay, and now mounted in the cabinet of Natural History of Madrid. The figure is not so done as to be relied on, and the account is only an abstract from that of Cuvier and Roume. This skeleton is also of the clawed-kind, and having only four teeth on each side above and below, all grinders, is in this account classed in the family of unquiculated quadrupeds destitute of cutting teeth, and receives the new denomination of megatherium, having nothing of our animal but the leg and foot bones, we have few points for a comparison between them. They resemble in their stature, that being 12 feet 9 inches long, and 6 feet $4\frac{1}{2}$ inches high, and ours by computation 5 feet 1.75 inches high: they are alike in the colossal thickness of the thigh and leg bones also. They resemble too in having claws but those of the figure appear very small, and the verbal description does not satisfy us whether the claw-bone, or only its horny cover be large. They agree too in the circumstance of the two bones of the fore-arm being distinct and moveable on each other; which however is believed to be so usual as to form no mark of distinction. They differ in the following circumstances, if our relations are to be trusted. The megatherium is not of the cat form, as are the lion, tyger, and panther, but is said to have striking relations in all parts of its body with the bradypus, dasypus, pangolin, &c. According to analogy then, it probably was not carnivorous, had not the phosphoric eye, nor leonine roar. But to solve satisfactorily the question of identity, the discovery of

* Monthly Magazine, Sep. 1796.

fore-teeth, or of a jaw bone shewing it had, or had not, such teeth, must be waited for, and hoped with patience. It may be better, in the mean time, to keep up the difference of name.

Nº. XXXI.

A Letter from Mr. JOHN HECKEWELDER to BENJAMIN SMITH BARTON, M. D. containing an Account of an Animal called the Big Naked Bear.

DEAR SIR,

Read March
10, 1797.

I HAVE now to communicate to you, what came to my knowledge respecting an animal, which the Mohican Indians called Ahamagachktiât Mecchquá, and the Delawares (if I recollect right) Amangachktiât. *The Big Naked Bear*. Their reports run thus : That among all animals that had been formerly in this country, this was the most ferocious. That it was much larger, than the largest of the common bears, and remarkably long-bodied : all over, (except a spot of hair on its back of a white colour,) naked. That it attacked and devoured man and beast, and that a man, or a common bear, only served for one meal to one of these animals. That with its teeth it could crack the strongest bones. That it could not see very well, but in discovering its prey by scent, it exceeded all other animals. That it pursued its prey with unremitting ravenousness, and that there was no other way of escaping, but by taking to a river, and either swimming down the same, or saving one's self by means of a canoe. That its heart being remarkably small, it could seldom be killed with the arrow. That the surest way of destroying him was to break his back-bone. That when a party went out to destroy this